AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A method of examining a sample by means of mass spectrometry, comprising the steps of:

- vaporizing in a vaporizer, the solution comprising the sample to be examined;
- spraying the vaporized solution using a gas flow, into a corona discharge zone, ionizing the sample to be examined, using a corona discharge, to generate gas phase ions; ~~and~~
- separating the gas phase ions and directing them to a detector, wherein
- the vaporiser is fabricated as a micromechanical structure;

wherein the vaporiser includes flow channel networks for the solution and for a carrier gas for the feeding of the solution, as well as a heater, all of which are included in a monolithic structure, and

wherein the vaporiser includes a vaporising zone and a corona discharge zone, both of which are integrated into a single micromechanical structure.

2. (canceled).

3. (previously presented): A method according to Claim 2, wherein the flow channel networks are dimensioned so that the volume of the liquid flow passing through them is less than 100 µl/min.

4. (canceled)

5. (previously presented): A method according to claim 1, wherein the micromechanical structure includes flow channel networks designed for one or more wafers, and a heater.

6. (previously presented): A method according to Claim 5, wherein the method is carried out by a structure which comprises:

a substrate wafer in which flow channel networks for gases and liquids are formed, and

a cover wafer, attached to the substrate wafer in which a heater for vaporising the sample solution, is patterned.

7. (previously presented): A method according to claim 1, further comprising ionizing, with a corona discharge in the presence of air, at a normal atmospheric pressure, the vaporized sample solution.

8. (previously presented): A method according to claim 1, wherein the corona discharge zone includes a needle-shaped electrode, which is connected to a voltage which is so high in relation to a curtain plate of the mass spectrometer that the electric field strength, at least in the immediate vicinity of the tip, exceeds the corona discharge threshold of air.

9. (previously presented): A method according to Claim 8, wherein the potential of the needle-shaped electrode in relation to a curtain plate is at least 1 kV, and the maximum electric field strength near the tip of the electrode is approximately 50 kV/mm.

10. (previously presented): A method according to claim 1, further comprising the step of examining polar compounds, non-polar compounds, neutral compounds or ionic compounds, and the sample to be examined is dissolved in a polar or non-polar solvent, used as the eluent, to generate the sample solution.

11. (previously presented): A method according to Claim 10, further comprising the step of examining the compounds, the molar masses of which are at most 2000 Da.

12. (previously presented): A method according to claim 1, further comprising the step of feeding the flow of liquid of the sample to be examined at a value which is lower than approximately 10 µl/min, and the flow of a carrier gas used for feeding the sample is set at a value which is at least approximately 50 µl/min.

13. (previously presented): A method according to claim 1, further comprising the step of ionizing the sample using the Atmospheric Pressure Chemical Ionization (APCI) method.

14. (previously presented): A method according to claim 1, further comprising the step of bringing in essentially perpendicular to the flow direction of the sample the gas flow used for the injection.

15. (previously presented): A method according to claim 1, further comprising the step of feeding the gas flow into the device in the flow direction of the vaporized sample solution, before and around a feed opening of the vaporized sample solution .

16. (previously presented): A method according to Claim 14, further comprising the step of feeding the gas flow through a feed opening, in order to distribute the gas flow around the liquid flow comprising the vaporized sample solution, and, as a result, a homogeneous mixture is achieved.

17. (currently amended): An apparatus for examining a sample by means of mass spectrometry, comprising

- a vaporiser for vaporising a solution comprising the sample to be examined,

- a corona discharge device, connected to the vaporiser, in which the sample to be examined is ionised according to the Atmospheric Pressure Chemical Ionization (APCI) method, to generate charged particles,
- a detector, connected to the corona discharge device, to detect charged particles, ~~and~~
- means for directing the charged particles, using electric and magnetic fields, from the corona discharge device to a detector, and
- the vaporiser is fabricated as a micromechanical structure;

wherein the vaporiser includes flow channel networks for the solution and for a carrier gas for the feeding of the solution, as well as a heater, all of which are included in a monolithic structure, and

wherein the vaporiser includes a vaporising zone and a corona discharge zone, both of which are integrated into a single micromechanical structure.

18. (canceled).

19. (previously presented): An apparatus according to Claim 18, wherein the flow channel networks are dimensioned so that the volume of the liquid flow passing through them is less than 100 µl/min.

20. (canceled).

21. (previously presented): An apparatus according to claim 17, further comprising:

said micromechanical structure includes a monolithic block which is formed of two or more parts which are connected to each other.

22. (previously presented): An apparatus according to Claim 21, further comprising:

the monolithic block comprises a silicon wafer in which flow channel networks for gases and liquid sample are formed, and a glass plate in which a heater for vaporising the sample solution is formed.

23. (previously presented): An apparatus according to Claim 21, further comprising:

the monolithic block includes a glass plate in which flow channel networks for gases and liquid are formed, and a silicon wafer in which a heater for vaporising the sample solution is formed.

24. (previously presented): An apparatus according to claim 17, further comprising:

the corona discharge device includes a needle-shaped electrode, which is connected to a potential which is so high in relation to a curtain plate of the mass spectrometer that the electric field strength, at least in the immediate vicinity of the tip of the electrode, exceeds the corona discharge threshold of air.

25. (previously presented): An apparatus according to Claim 24, wherein the potential of the needle-shaped electrode in relation to a curtain plate is set at a value which is at least 1 kV, and the maximum strength of the electric field near the tip of the electrode is set at least at approximately 50 kV/mm.

26. (previously presented): An apparatus according to claim 17, further comprising:

the micromechanical structure is fabricated entirely as a glass structure.

27. (previously presented): An apparatus according to claim 18, further comprising:

the flow channel system of the carrier gas used for feeding the solution is connected to a feed nozzle of the gas, which nozzle is located upstream in the flow direction of the vaporized sample solution and through which gas can be fed into the device essentially perpendicular to the flow direction of the sample solution.

28. (previously presented): A device according to Claim 27, further comprising:

the gas flow fed through the feed nozzle is distributed before and around a vaporized solution feed nozzle of the flow channel networks in order to achieve a homogeneous mixture.

29. (previously presented): A device according to claim 17, further comprising:

the heater includes heating resistors, the foreparts of which are made wide in order to decrease the flow resistance and which are made narrow only near the mixing zone of gas and liquid, where they act as heating resistors and form the actual heating zone.

30. (canceled).

31. (canceled).

32. (canceled).

33. (previously presented): The method according to claim 10, further comprising the step of examining the compounds, the molar masses of which are at most 1000 Da.

34. (currently amended): An apparatus for examining a sample by means of mass spectrometry, comprising

- a vaporiser for vaporising a solution comprising the sample to be examined,
- a corona discharge device, connected to the vaporiser, in which the sample to be examined is ionised according to the Atmospheric Pressure Chemical Ionization (APCI) method, to generate charged particles,
- a detector, connected to the corona discharge device, to detect charged particles, ~~and~~
- means for directing the charged particles, using electric or magnetic fields, from the corona discharge device to a detector, and
- the vaporiser is fabricated as a micromechanical structure;

wherein the vaporiser includes flow channel networks for the solution and for a carrier gas for the feeding of the solution, as well as a heater, all of which are included in a monolithic structure, and

wherein the vaporiser includes a vaporising zone and a corona discharge zone, both of which are integrated into a single micromechanical structure.

35. (previously presented): The apparatus of Claim 17, further comprising:

said flow channel system includes wedge-shaped guides which form a tapering hole at a discharge end.

36. (previously presented): A method according to Claim 2, wherein the flow channel networks are

dimensioned so that the volume of the liquid flow passing through them is less than 10 µl/min.

37. (previously presented): An apparatus according to Claim 18, wherein the flow channel networks are dimensioned so that the volume of the liquid flow passing through them is less than 10 µl/min.